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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/530,588	05/05/2000	KIMIHIRO MATSUSE	2312-0866-2P	6686

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ALEXANDRIA, VA 22314

EXAMINER

QUACH, TUAN N

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 07/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/530,588

Applicant(s)

MATSUSE ET AL.

Examiner

Tuan Quach

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 29 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 112-128 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 112-128 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☒ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

This application presents a claim for subject matter not originally claimed or embraced in the statement of the invention. The various subject matter delineated in the claims, e.g., claims 112, 121, and 126, e.g., processing vessel, shutting off the supplying of the gases, removing by purging, etc., are not originally claimed or embraced in the statement of the invention. A supplemental oath or declaration is required under 37 CFR 1.67. The new oath or declaration must properly identify the application of which it is to form a part, preferably by application number and filing date in the body of the oath or declaration. See MPEP §§ 602.01 and 602.02.

The abstract of the disclosure is objected to because it fails to describe the invention now claimed. Correction is required. See MPEP § 608.01(b).

Claim 120 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support from the specification for a process to form a film containing tungsten made of  $WN_x$  or  $WSi_xN_y$  by supplying  $WF_6$  and  $SiH_4$  in the context of claim 112.

Claims 112-128 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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"a predetermined pressure" as in claims 112, 121, 126, line 4 is indefinite as the pressure encompassed cannot be determined.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 112-128 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chow et al. (Chow) singly or with Park et al. (Park).

Chow teaches introducing tungsten hexafluoride, silane and hydrogen to the reactor to form the tungsten containing layer, after forming the tungsten containing layer, stopping the flow of the gases, evacuating the reaction chamber, introducing nitrogen containing gas to form nitride containing tungsten. The use of plasma and the use of argon for backfill flushing prior to introducing nitrogen containing gas for forming the nitride is also. See column 2 line 27 to column 3 line 56. The maintaining of a predetermined pressure would have been obvious and inherent to obtain the operating pressure as delineated at column 2 lines 38-47; alternatively, the maintaining of a low pressure to minimize influence of any remaining materials in the reaction chamber prior to injecting reaction gas is conventional and advantageous as delineated in Park, column 2 lines 54-57. The purging of the  $WF_6$  would have been obvious as argon for backfill flushing is contemplated and as the chamber is evacuated. The use of conventional purging gas such as nitrogen is well known in the art and as such would have been obvious. Regarding the use of same apparatus or different apparatus, e.g.,

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claim 114, such corresponds to two obvious alternatives and as such would have been obvious. The selection of appropriate conventional nitrogen containing gases including  $N_2$ ,  $NH_3$ , MMH, is well within the purview of one skilled in the art, and conventional as alternative nitrogen sources and as acknowledged in the admitted prior art, instant specification page 19 lines 14-15. Alternatively, official notice is given hereby regarding such conventional alternative nitrogen sources. Disilane or dichlorosilane correspond to well known alternatives to silane and as admitted in the instant specification page 15 lines 7-8. The selection and optimization of appropriate parameters including temperatures, pressures, flow rates of the forming gases and of the gas containing nitrogen, would have been a matter of routine experimentation and would have been further obvious given the teachings of Chow at column 2 lines 39-44.

Claims 115, 123, 127 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chow singly or with Park as applied to claims 112-128 above, and further in view of Hatano et al.

Regarding the alternative sources of nitrogen, in addition to the reasons delineated above, the use of MMH as nitrogen containing source would have been further conventional and obvious as evidenced by Hatano et al., column 4 lines 9-63 for nitridation.

Claim 117 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chow singly or with Park as applied to claims 112-128 above, and further in view of Buyn et al.

Regarding the tungsten containing layer including tungsten silicide, such would have been obvious as documented by Buyn et al., column 3 line 67 to column 4 line 3

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wherein the tungsten containing layer including tungsten silicide where silicon source, e.g.,  $\text{SiH}_2\text{Cl}_2$  and  $\text{SiH}_4$  is employed and wherein such silicide material is known to be advantageous as conductor having improved characteristics including low resistivity.

Claim 120 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chow singly or with Park as applied to claims 112-128 above, and further in view of Park and Fleming et al.

The formation of conventional tungsten nitride or tungsten silicon nitride having desired barrier characteristics would have been conventional and obvious and is further evidenced in Park, column 2 lines 48-52; by Fleming et al., the abstract, column 4 lines 29 to column 5 line 67, and as such would have been obvious.

Claim 122 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chow singly or with Park as applied to claims 112-128 above, and further in view of Yelverton et al.

Regarding the use of nitrogen as the purging gas, such would have been obvious in view of the teaching of Yelverton et al., column 2 line 14 wherein the use of nitrogen as the preferable inert purge gas is taught.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Quach whose telephone number is 703-308-1096. The examiner can normally be reached on M - F from 9 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Wael Fahmy can be reached on (703) 308-4918. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9318 (Before Final) and (703) 872-9319 (After Final).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Tuan Quach  
Primary Examiner